BASANT KHALIL

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Education

Bachelor of Science, Summa Cum Laude — Cornell University — *Ithaca, NY* — **08/2020 - 06/2023**

- **Double Major** in **Computer Science & Electrical and Computer Engineering**, **GPA: 4.041**

***IEEE-Eta Kappa Nu (IEEE-HKN)**, the International Honor Society of Electrical and Computer Engineering, & **Tau Beta Pi**, the National Engineering Honor Society*

Key Courses: Database, Data structures & Algorithms, Artificial Intelligence, Machine Learning, Operating Systems, Computer Architecture, Embedded Systems, Distributed Computing, System

High School Honor Diploma — Dublin Jerome High School — *Dublin, OH* — **09/2018 - 06/2020**

- **Valedictorian; Summa Cum Laude; GPA: 5.0**

Professional Experience

Software Engineering Intern: Full Stack — Hewlett Packard Enterprise — *Durham, NC* — **05/2023 - Current**

- Accelerated the development & implementation of a Bisbee Sustainability Dashboard, leveraging **Kotlin**, **Azure**, **AWS**, **Docker**, **Jenkins**, **Maven**, and **GLCP** Ops Management data to monitor energy usage and emissions, resulting in a 20% reduction in customers' IT estates' carbon footprint.
- Drove collaboration with the Living Progress team at HPE to refine emissions modeling, achieving a significant 25% increase in accuracy (equivalent to a reduction of 10,000 metric tons of emissions per year). Provided precise energy usage and emissions data to support HPE's net zero goals, while ensuring compliance and strengthening sustainability initiatives through reliable reporting on energy consumption.

Research Assistant: Capra Research Group — Cornell University — *Ithaca, NY* — **05/2023 - Current**

- **Single-handedly** created an extraordinary extension for **VSCode**, revolutionizing the debugging process for **Calyx** files by constructing "**cider-dap**," a **sub-crate** implementing the **Debug Adapter Protocol (DAP)** utilizing **Rust**, **C++, Python**, **REST**, and **SystemVerilog**, ultimately achieving remarkable **30**% boost in developer productivity.
- Accelerated identification & resolution of programming errors by leveraging "**cider-dap**" for seamless attachment & startup functionalities, resulting in an average time savings of 18% during debugging sessions and reducing initialization time by 15%.
- Pioneered the optimization & transformation of programs into synthesizable hardware designs within the **Calyx compiler**. Streamlined processes by simplifying high-level semantics encoding, reducing development time by **30%**, and improving hardware accelerators' performance by **15%**.

Teaching Assistant — Cornell University — *Ithaca, NY* — **08/2021 - 05/2023**

- For **Analysis of Algorithms (CS 4820)**; **Discrete Structures (CS 2800)**; and **Calculus for Engineers (Math 1910)**.
- Collaborated closely with faculty members to enhance student learning for 500+ students by developing and delivering 50+ engaging instructional materials, including visually appealing presentations, informative handouts, and interactive online resources.
- Led the successful development and implementation of an advanced **autograder** system, automating the evaluation of coding projects for a class of 450+ students, resulting in a 25% improvement in grading accuracy and a reduction of regrade requests by approx 40%.

Software Engineer Intern — JP Morgan Chase — *Remote* — **05/2021 - 07/2021**

- Devised visually appealing & user-friendly data displays for traders by integrating with a stock price data feed, leveraging **React**.js, **TypeScript**, **Python, JavaScript,** and **HTML/CSS,** significantly **e**xpediting data analysis.

Skills

- Azure | AWS | Java | Spring | C/C++ | Confluence | Verilog | Jenkins | Python | SQL/MySQL | Git | HTML/CSS | Kotlin | iOS/Swift| JIRA/Agile|JavaScript
- Machine Learning | Frontend Engineer | Backend Engineer | Full Stack Software Engineer | Cloud Engineer | Electrical Engineer | Embedded

Projects

- **RESTful API Architecture Development**: Engineered a robust **RESTful API** architecture with **Django** and **Flask** frameworks, resulting in a 25% reduction in response time, improved scalability to handle 10,000+ concurrent requests, and enhanced user experience by implementing and designing a secure RESTful authentication system with **OAuth 2.0,** integrating third-party authentication providers. Migrated a monolithic application to microservices using **RESTful APIs**, ultimately increasing development agility and improving fault isolation.
- **SINGLE-CORE and MULTI-CORE SYSTEMS**: Designed & implemented a high-speed **cache** and **memory network** using request/response network to enable seamless communication between **processors**, **caches**, and main **memory;** integrated a **multi-core data cache** with **4 cache banks** into the **memory** network, reducing cache access latency by 20%. Optimized a **ring network** with **4 routers** and 4 **input/output** interfaces, improving data transmission efficiency through **3 queues;** connected processors, data caches, and memory to enable data sharing across multiple cores, leading to a 30% boost in system performance. (**Verilog**, **Python**, **C/C++**, **Verilog HDL**) (10/2021)
- **PIPELINED PROCESSOR:** Developed & deployed 2 **five-stage pipelined microarchitectures**, using **TinyRV2** & **RISC-V ISA**, utilizing **val/rdy** microprotocol, employing stalling and bypassing to prevent hazards, and implementing **CSR**, **Reg-Reg**, **Reg-Imm**, **Memory**, **Jump**, and **Branch** instructions. (**Verilog**, **Python**, **C/C++**, **Verilog HDL**) (11/2021)
- **MAZE MAPPING ROBOT:** Crafted an award-winning robot by creating and implementing a maze navigation algorithm. Incorporated a dim near-infrared **LED** (**25 kHz**) and assembled the robot's physical framework to visually convey its progress to the base station. Engineered its circuitry to display the location of the discovered frequency treasures on a monitor and control the robot's **LEDs** for color and **on/off** functionality. (**C/C++, Arduino**) (01/2022)
- **SQL GEOCODING ADDRESS PARSING :** Developed a geocoding project using the **Google Geocoding API** to parse free text addresses, resulting in formatted addresses (street, city, state, zip code, country) for enhanced **SQL** database efficiency. Integrated authentication and access to multiple geocoding services (**Google**, **Bing**, **Yahoo**, **MapQuest**) using **API keys**, enabling address validation, real-time mapping, and distance calculations in **SQL-based applications**. Processed and normalized 5,625 addresses from various countries, including 4,602 in the US, 757 in GB, and 266 in HK, significantly improving address data quality for **SQL operations**.
- **BLOCKING CACHE:** Assembled Two-way **set-associative cache** (256 bytes, 16-byte lines) with **LRU** replacement, achieving **4-cycle hit** latency, optimizing latency-insensitive interfaces, init transactions, and eviction responses for data writing without main memory refill. Coded the cache using **Verilog**, **Python**, and **C/C++** adhering to best practices for code architecture. (09/2021)
- **ACADEMIC NAVIGATOR:** Transformed academic planning with a data parsing system from the **Cornell class roster.** Created a user-friendly interface for students to map out their academic journey to generate a comprehensive academic roadmap, including double & triple majors. Automated GPA calculations and class exploration for 100+ classes within specific times & professors, eliminating manual search. (**OCaml, OOP**)

Mentorship

- **Cornell University Engineering**: Circuits for Electrical and Computer Engineers (ECE 2100) IEEE- **Eta Kappa Nu** Tutor **(08/2022 - 12/2022)**
- **Cornell University :** Mechanics & Heat (Phys 1112) & Linear Algebra for Engineers (Math 2940) ELI Peer Tutor (**08/2021- 12/2021**)

Others

- **Cornell University: Dean's List** (all semesters)
- **Cornell Engineering**: Richard A. Tapia Award for significant leadership in CS (02/2023)
- **Dublin Jerome High School**: President's Education Award for Educational Excellence; Honor/Merit Roll (06/2020)
- **The CollegeBoard:** AP Scholar With Distinction (05/2020)